



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,383	11/13/2006	Sture Lindahl	43315-229589	9435
26694	7590	08/04/2009		
VENABLE LLP P.O. BOX 34385 WASHINGTON, DC 20043-9998			EXAMINER PHAM, EMILY P	
			ART UNIT 2838	PAPER NUMBER
			MAIL DATE 08/04/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/573,383

Applicant(s)

LINDAHL ET AL.

Examiner

Emily Pham

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-48 and 50-93 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-48 and 50-93 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/24/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 42-46, 48, 50, 58, 66-74, 77-80, 83-87, and 90-93 are rejected under 35 U.S.C. 102(b) as being anticipated by Beckwith (USP 5,530,338).

Regarding independent claim 42: Beckwith (**FIG 5**) discloses a high voltage AC transmission cable system for transmitting power between two points each connected to one or more power networks, comprising: an AC transmission cable (**310, 311**) having two ends; two transformers (**306, 307**) with variable voltage transformation, wherein each of the two transformers (**306, 307**) is arranged in shunt connection at one of the two ends each end of the AC transmission cable (**310, 311**); two voltage control members (**320, 321**), each of which is operatively connected to one of said two transformers (**306, 307**) and which are operative to control said two transformers (**306, 307**) in a coordinated manner to regulate an operating voltage level of said AC transmission cable (**310, 311**) whereby losses due to reactive power transport are minimized; and two tap-changers (**313, 314**), each of which is operatively connected to one of the two voltage control members (**320, 321**) and to a corresponding one of said transformers (**306, 307**) to vary the voltage transformation of the transformer (**306, 307**) according to said operating voltage.

Regarding claim 43: Beckwith (**FIG 5**) discloses each the voltage control member (**320, 321**) is operative to operate said system at an optimal voltage dependent on a surge impedance of the cable (**310, 311**) and an instantaneous power level.

Regarding claim 44: Beckwith (**FIG 5**) discloses each the voltage control member (**320, 321**) is operative to operate said system at an optimal voltage dependent on an instantaneous power level equal to a Natural Load of the cable (**310, 311**).

Regarding claim 45: Beckwith (**FIG 5**) discloses each the voltage control member (**320, 321**) is operative to operate said system at a voltage whereby a sum of resistive losses, dielectric losses and charging losses are minimized.

Regarding claim 46: Beckwith (**FIG 5**) discloses each the voltage control member (**320, 321**) is arranged for communication with control equipment at both ends of said AC transmission cable (**310, 311**).

Regarding claim 48: Beckwith (**FIG 5**) discloses each of the transformers (**306, 307**) is arranged to operate with a wide ratio of input voltage to output voltage of between 1: 1 to 1: 2, or greater.

Regarding claim 50: Beckwith (**FIG 5**) discloses each the voltage control member (**320, 321**) comprises a power electronic device which may be any of the list of: IGBT, IGCT, GTO, Thyristor, Diode.

Regarding claim 58: Beckwith (**FIG 5**) discloses one or more parallel cables (**310, 311**) for each phase, wherein each cable (**310, 311**) is arranged for rapid disconnect and reconnect (**breaker 302**).

Regarding claim 66: Beckwith (**FIG 5**) discloses one end of the transmission cable (**310, 311**) may be connected to one or more electrical machines isolated from the rest of the system.

Regarding claim 67: Beckwith (**FIG 5**) discloses transformer (**306, 307**) arranged nearest the one or more electrical machines has a fixed transformation ratio or comprises off-load tap-changers (**313, 314**) only.

Regarding claim 68: Beckwith (**FIG 5**) discloses voltage regulation of the one or more electrical machines is controlled according to natural load and minimize losses principle applied to a tap changer (**313, 314**).

Regarding claims 69-74 and 77-80: Beckwith (**FIG 5**) discloses the apparatus at its normal operation performing the steps of method recited in claims 69-74 and 77-80.

Regarding independent claim 83: Beckwith (**FIG 5**) discloses a high voltage AC transmission cable system for transmitting power between two points each connected to one or more power networks, the system comprising:
two transformers (**306, 307**) with variable voltage transformation, each of which is arranged in shunt connection at one of two ends of the AC transmission cable (**310, 311**); two voltage control members (**320, 321**), each of which is operatively connected to one of said two transformers (**306, 307**) and which are operative to control said two transformers (**306, 307**) in a coordinated manner to regulate an operating voltage level of said AC transmission cable (**310, 311**) dependent on the surge impedance of the cable (**310, 311**) whereby losses due to reactive power transport are minimized; and two tap-changers (**313, 314**), each of which is operatively connected to one of the two

voltage control members **(320, 321)** and to a corresponding one of said two transformers **(306, 307)** to vary a voltage transformation of the voltage transformers **(306, 307)** according to said operating voltage.

Regarding claim 84: Beckwith **(FIG 5)** discloses the voltage control members **(320, 321)** are operative to operate said system at an optimal voltage dependent on the surge impedance of the cable **(310, 311)** and the instantaneous power level.

Regarding claim 85: Beckwith **(FIG 5)** discloses the voltage control members **(320, 321)** are operative to operate said system, at an optimal voltage dependent on an instantaneous power level equal to the Natural Load of the cable **(310, 311)**.

Regarding claim 86: Beckwith **(FIG 5)** discloses the voltage control members **(320, 321)** are operative to operate said system at a voltage whereby the sum of the resistive losses, dielectric losses and charging losses are minimized.

Regarding claim 87: Beckwith **(FIG 5)** discloses the voltage control members **(320, 321)** are arranged for communication with control equipment at both ends of said AC transmission cable **(310, 311)**.

Regarding claim 90: Beckwith **(FIG 5)** discloses one end of the transmission cable **(310, 311)** may be connected to one or more electrical machines isolated from the rest of the system.

Regarding claim 91: Beckwith **(FIG 5)** discloses one of the two transformers **(306, 307)** arranged nearest the one or more electrical machines has a fixed transformation ratio or comprises off-load tap-changers **(313, 314)** only.

Regarding claims 92 and 93: Beckwith (**FIG 5**) discloses the apparatus at its normal operation performing the steps of method recited in claims 92 and 93.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 47, 75, and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Hubert et al. (USP 6,577,108).

Beckwith discloses claimed invention except for the control member is arranged with control instructions for operation of said AC transmission cable under thermal overload conditions during limited periods of time. Hubert et al. teach the control member is arranged with control instructions for operation of said AC transmission cable under thermal overload conditions during limited periods of time (**FIG 4, FIG 5; col. 5, lines 29-45**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the controller of the AC power transmission disclosed by Beckwith with the voltage regulation circuit taught by Hubert et al. to monitor the temperature of the AC transmission cable.

5. Claims 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Larsen et al. (USP 5,166,579).

Beckwith discloses claimed invention except for mechanical tap-changer/phase-shifting tap changer. Larsen et al. teach mechanical tap-changer/phase-shifting tap changer (**Abstract**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power transmission system disclosed by Beckwith with the mechanical tap-changer/phase-shifting tap changer taught by Larsen et al. to increase the effectiveness in controlling the reactance of the AC transmission line.

6. Claims 53 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Andrei (USP 6,011,389).

Beckwith discloses claimed invention except for an autotransformer. Andrei teaches an autotransformer (**Abstract; col. 2, line 50 – col. 3, line 13**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power transmission system disclosed by Beckwith with the autotransformer taught by Andrei to increase the effectiveness in controlling the reactance of the AC transmission line.

7. Claims 55 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Sasse et al. (US Pub 2004/0012472).

Beckwith discloses claimed invention except that transformer is arranged to limit short-circuit currents. Sasse et al. teaches transformer is arranged to limit short-circuit currents (**par [0033]**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power

transmission system disclosed by Beckwith with the arrangement taught by Sasse et al. to limit short-circuit currents of the AC transmission line.

8. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Retotar (USP 4,591,963).

Beckwith discloses claimed invention except for a high frequency filter. Retotar teaches a high frequency filter (**FIG 1, 102; col. 2, lines 20-25**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power transmission system disclosed by Beckwith with the a high frequency filter taught by Retotar to eliminate the harmonic currents of AC transmission line.

9. Claims 59 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Buckett et al. (USP 4,075,679).

Beckwith discloses claimed invention except for one or more breakers arranged for rapid disconnect and reconnect. Buckett et al. teach breakers arranged for rapid disconnect and reconnect (**FIG 4, 17**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power transmission system disclosed by Beckwith with the breakers taught by Buckett et al. to increase the effectiveness in controlling the reactance of the AC transmission line.

10. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Palmer (USP 4,081,741).

Beckwith discloses claimed invention except for a tap-changer /one or more tap changer by-pass connectors. Palmer teaches a tap-changer /one or more tap changer by-pass connectors (**FIG 4, col. 3, lines 10-31**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the transformers of the AC power transmission system disclosed by Beckwith with the tap changer by-pass connectors taught by Palmer to increase the effectiveness in controlling the reactance of the AC transmission line.

11. Claims 61-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Wilkins et al. (USP 6,924,565).

Beckwith discloses the claimed invention except that one AC transmission cable comprise an oil and paper insulated cable/XLPE insulated cable/ voltage protection devices. However oil and paper insulated cable/XLPE insulated cable/ voltage protection devices are well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use oil and paper insulated cable because it is secured from moisture and dielectric loss; XLPE insulated cable because this cable with a temperature sensing optic fiber placed longitudinally along the cable could be placed in the critical circuit such as duct or overhead transmission line having unknown thermal conditions; voltage protection devices because they protect the AC transmission system from over voltage condition.

12. Claims 64, 65, and 89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Watson et al. ("Surge Potentials

on Underground Cable Sheath and Joint Insulation"; IEEE Transactions on Power Apparatus and Systems; June 1963; Volume 82; Issue 66; pages 239-249).

Beckwith discloses claimed invention except for a cable system shield comprising transposings and sheath sectionalizing insulators reducing shield induced currents. Watson et al. teach a cable system shield comprising transposings and sheath sectionalizing insulators (**col. 1, page 239**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the cable of the AC power transmission system disclosed by Beckwith with the transposings and sheath sectionalizing insulators taught by Watson et al. to protect the line from overvoltage and reduce shield induced currents.

13. Claims 81 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beckwith (USP 5,530,338) in view of Ghosh et al. (USP 6,925,385).

Beckwith discloses claimed invention except for a graphical user interface for controlling the AC transmission, the interface comprising: at least one object oriented application for presenting data, parameter values and control actions for operating parameters of the AC transmission cable system. Ghosh et al. teach a graphical user interface for controlling the AC transmission (**GUI to control and manage the wind power system**) the interface comprising: at least one object oriented application for presenting data, parameter values and control actions for operating parameters of the AC transmission cable system and/or a control system for at least one transformer (**FIG 2 – FIG 10; col. 11, lines 20-30**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the controller of the AC

Art Unit: 2838

power transmission disclosed by Beckwith with the GUI system taught by Ghosh et al. for the purpose of control and manage the AC power transmission system through data and parameters communication.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emily Pham whose telephone number is (571)270-3046. The examiner can normally be reached on Mon-Thu (7:00AM - 6:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash Gandhi can be reached on (571) 272 - 3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jessica Han/
Primary Examiner, Art Unit 2838
July 2009

EP